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AUTHOR Annis, Linda
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ABSTRACT

In a study designed to relate research on cognitive style to study technique effectiveness, a group of 129 college freshmen was given a test to assess the cognitive style of each. The 93 students who scored in the upper 1/3 and in the lower 1/3 of the distribution were classified as field independent and field dependent. These 93 students were then assigned either to read only or to read and take notes on a passage. Half of the students received the original organized version of the passage while the other half received a scrambled passage in which the order of the sentences within each paragraph of the passage was randomly reordered. One week later, the students were given an examination consisting of a free recall test and a set of 32 completion questions. A significant main effect for the variable of study technique was found, but none of the interactions was reliable. The field independent students were better able than the field dependent students to complete sentences of high structural importance regardless of whether the task required analyzing organized material or structuring unorganized material. (TJ)

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THE EFFECT OF COGNITIVE STYLE AND LEARNING PASSAGE ORGANIZATION ON STUDY TECHNIQUE EFFECTIVENESS[1]

Linda Annis

Ball State University

Witkin and his associates have accumulated evidence to demonstrate that the field-independent-dependent (articulated-global) dimension of cognitive style has a pervasive influence on learning (Witkin, Moore, Goodenough, & Cox, 1977). There is now an increasing research emphasis on the implication of cognitive style differences in learning for educational practice. One area of application that has been neglected is the effect cognitive style has on study technique effectiveness. This line of investigation holds promise because previous studies, which generally compared study techniques without taking into account individual difference variables such as cognitive style or learning situation characteristics, provide no clear evidence that students learn more when they use one study technique as compared to another.

The one previous study (Annis & Davis, 1978) which examined the relationship between cognitive style and study technique effectiveness uncovered a complex but interesting relationship between the use of a preferred or nonpreferred study technique, review or nonreview, and cognitive style. It was found that field-independent (FI) students generally scored better than field-dependent (FD) students except when they were assigned to use both a less effective preferred study technique and no review.

The purpose of the present study was to extend this line of investigation by examining the influence of cognitive style, logical or scrambled learning passage organization, and the two commonly used study techniques of reading only and note taking on the way learning material is processed

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and on what is learned. According to Witkin et al. (1977), "persons with an articulated cognitive style are likely to analyze a field when the field is organized, and to impose structure on a field when the field lacks organization of its own. Persons with a global style are more likely to go along with the field 'as is,' without using such mediational processes as analyzing and structuring" (p. 21). In view of this characterization of FI-FD, it can be argued that note taking, which requires the learner to determine what is important to be learned and then to encode this material into a personally meaningful form, would be more effective for FI than FD learners especially when the material is unorganized. On the other hand, while reading only may be about equally effective for FI and FD learners when the passage is well organized and requires little or no analyzing by the reader, it would appear that FI students would be better able than FD students to structure an unorganized passage through the use of reading only.

It is also possible that cognitive style makes a greater difference in how a person learns than in <u>how much</u> is learned (Witkin et al., 1977) In order to investigate this possibility, the influence of cognitive style on the learning of material judged to be of high and low structural importance (SI) to the overall meaning of the entire learning passage was examined through the use of a normative assessment method devised by Johnson (1970). Johnson asked readers to rate each sentence in a passage as to its importance to the overall meaning of the reading passage. Thus a SI rating for each of the sentences could be computed. Low SI sentences usually gave specific examples and illustrations while high SI sentences were more likely to be abstract and general such as topic sentences.

If FI persons are better than FD persons at analyzing organized material and at structuring unorganized material, then it would seem

that regardless of whether they were taking notes or reading only they would be more likely to pick out and remember material of high SI from both organized and unorganized passages. On the other hand, FD students using either note taking or reading only may be more likely than FI students to focus on and retain material of low SI, particularly with unorganized passages, because of their difficulty in structuring material enough to distinguish items of high and low SI.

Subjects were 129 freshmen enrolled at a midwestern university. The Group Embedded Figures Test (GEFT) was administered to all students in order to assess their cognitive style. The 93 students whose scores were in the upper 1/3 and the lower 1/3 of the GEFT score distribution for their sex were classified as FI or FD. Subjects were assigned either to read only or to read and take notes on an 80-sentence passage entitled "Evolution of the Brain." Half of the students received the original organized version of the passage while the other half received a scrambled passage in which the order of the sentences within each paragraph of the passage was randomly reordered.

One week later an examination consisting of a free recall test and 32 completion questions was given. Students were first asked to write down as much as they could remember from the passage. They were then given a completion test devised by Rickards and Friedman (1977) and based on the normative SI ratings for the passage obtained from Johnson (1970). The test required the students to fill in an essential word or phrase omitted from a high rated (on the average upper 80%) SI sentence and a low rated (on the average lower 20%) SI sentence taken from each of the 16 paragraphs in the passage.

The free recall tests were scored using a method devised by Rickards and August (1975). The method basically involved reducing each sentence in the text to the minimum number of words possible without losing

essential meaning. Synonymns and variations in phrasing were acceptable if the semantic meaning remained the same. The completion tests were scored using a similar lenient criterion as long as the essential meaning was preserved. In addition, the notes taken by the students were analyzed for the average SI of the sentences in the learning passage to which they referred and for the total number of sentences in the passage on which notes were taken.

Eight treatment conditions resulted from the three independent variables of Cognitive Style (FI or FD), Study Technique (reading only or note taking), and Learning Passage Organization (organized or unorganized). Four dependent variables were employed in the first analysis: low SI completion score, high SI completion score, total SI completion score, and free recall score. In addition, a second analysis was performed on the notes taken by the 41 students in that condition for the two dependent variables of average SI of the sentences in the passage on which notes were taken.

A 2 X 2 X 2 unweighted-means multivariate analysis of variance was performed on the data for the 93 subjects. This analysis indicated a significant main effect for the variable of study technique (F (4, 74) = 7.50, $p < .0001$). None of the interactions were reliable.

Separate univariate analyses were conducted for each of the four dependent variables. The univariate analysis for low SI completion indicated a significant interaction of Learning Passage Organization by Study Technique (F (1, 77) = 4.95, $p < .05$). The mean low SI scores were 2.91 for reading an organized passage, 4.17 for reading an unorganized passage, 3.42 for note taking on an organized passage, and 2.77 for note taking on an unorganized passage. The univariate analysis for high SI completion indicated there was a cognitive style effect (F /

(1, 77) = 3.81, $p < .05$). The mean score was 1.44 for FD subjects and 2.29 for FI subjects.

An unweighted-means multivariate analysis of variance also was performed on the data for the 41 subjects who took notes. This analysis found no significant main effects. However, the univariate analysis for the average SI of the sentences onwhich notes were taken indicated a significant effect for learning passage organization (F (1, 37) = 4.24, $p < .05$). The mean SI of notes taken on the organized learning passage was 23.84 while it was 21.09 for notes taken on the unorganized learning passage. In addition, the effect of learning passage organization on the average number of sentences on which notes was taken was marginally significant (F (1, 37) = 3.76, $p < .06$) indicating a tendency for learners to take more notes on organized than unorganized learning passages. The mean number of sentences that notes were taken on for the organized learning passage was 12.84 while it was 9.23 for the unorganized passage.

The most interesting result, which supports the Witkin group's characterization of FI-FD, was the significant main effect of cognitive style on high SI completion scores. As hypothesized, FI students were better able than FD students to complete sentences of high SI regardless of whether the task required analyzing organized material or structuring unorganized material. It seems likely that FI students scored better than FD students because they <u>actively</u> abstracted general principles and mediating concepts from the passage. FD students however are more likely to use a <u>spectator</u> approach to learning relying on the characteristics of the learning task itself rather than analyzing or imposing their own structure on it (Witkin et al., 1977). While it was hypothesized that FD students would retain more material of low SI, since it was difficult for them to distinguish material of high and low SI, no significant effect of cognitive style for low SI was found. Further investigation is needed

into this relationship.

None of the interactions of Cognitive Style by Learning Passage Organization by Study Technique appraached significance. But there was a significant interaction of Learning Passage Organization by Study Technique for the dependent variable of low SI. The results however are difficult to interpret since the main effect for the interaction was not significant. Perhaps what explains the results is the amount of attention involved in order to encode the material into a personally meaningful form. Students reading an unorganized passage have to pay more attention to encode it than an organized passage. However the note takers, instead of attending more to the unorganized passage, may have acted more passively and just copied down the author's sentences. When the passage was organized, they were more active in encoding the material.

The analysis of notes was interesting in that as expected the notes taken over an organized learning passage were of higher average SI than notes taken over an unorganized learning passage. However, this result appears to conflict with the finding from the first analysis that note takers tend to score better on items of low SI in organized than unorganized passages. The marginally significant finding that notes are taken on more sentences in an organized than an unorganized passage offers a possible explanation. It may be that since there is a tendency to take more notes over an organized passage, note takers add more specific examples and hence retain more information of low SI from an organized than from an unorganized passage.

This study is an initial attempt to relate research on cognitive style to study technique effectiveness. The results are intriguing enough to provide encouragement for further work aimed at uncovering significant relationships.

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